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*With international search report.**With amended claims.*(54) Title: METHOD OF QUALITY IMPROVEMENT OF WOODEN ARTICLES, SUCH AS IMPROVED PRESERVA-
TION OF THE WOOD THROUGH IMPREGNATION THEREOF

(57) Abstract

A method of quality improvement of wooden articles, such as improved preservation of wood through impregnation thereof. The impregnation is carried out by immersing the wooden articles in a bath of hot linseed oil or similar vegetable oil heated to at least 110 °C, whereby the water present in the wood evaporates and diffuses through the wood and the oil while the hot oil simultaneously penetrates into the pores and cavities of the wood. The wooden articles are then taken out of the bath and the oil oozed in is made to cure and thereby to stiffen the wood. During the immersion of the wooden articles, the linseed oil bath has a temperature of up to 250 °C, preferably near 250 °C. An insecticide and/or fungicide has been added to the linseed oil. As a result, the finished wooden articles do not warp or display cracks or crevices and the wooden articles are resistant to insect or fungus attacks.

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Title: Method of quality improvement of wooden articles, such as improved preservation of the wood through impregnation thereof.

Technical Field

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The invention relates to a method of quality improvement of wooden articles such as improved preservation of wood through impregnation thereof, and where the impregnation is carried out by the wooden articles being immersed in
10 a bath of hot linseed oil or similar vegetable oil, heated to at least 110°C, whereby the water present in the wood evaporates and diffuses through the wood and the oil while the hot oil simultaneously penetrates into the pores and cavities of the wood, whereupon the wooden articles are
15 taken out of the bath and the oil oozed in is made to cure and thereby to stiffen the wood.

Background Art

French patent No. 397,789 discloses a method for drying wood and improving the quality of the wood by immersing said
20 wood into hot linseed oil or similar oils. The temperature of the oil must be sufficiently high for the water in the wood to evaporate and the wood to be impregnated with the oil. It is stated that the temperature is conventionally 100-110°C. This method is not quite satisfactory because
25 the wooden articles tend to be distorted at this relatively low impregnation temperature, as is also the case when drying in hot air.

Disclosure of the Invention

It is the object of the invention to provide a method of
30 the above type which makes it possible to carry out the desired impregnation without the wooden articles being distorted or displaying cracks or crevices, and which is capable of preventing or destroying a possible insect or

fungus attack on the wood.

The method according to the invention is characterised in that during the immersion of the wooden articles, the linseed oil bath has a temperature of up to 250°C, preferably near 250°C, and that an insecticide and/or fungicide has been added to the linseed oil. As a result, first of all the treated wooden articles do not warp or display cracks or crevices and they are, furthermore, resistant to insect or fungal attacks. By the penetration of the very hot oil the temperature of the wood is increased almost shock-like, whereby its natural or absorbed content of water is suddenly brought above the boiling point and is sweated out. The water is thus replaced by the oil which fills all natural or unnatural cavities of the wood. After a natural or accelerated drying, the oozed in oil cures, thereby stiffening/improving the wood. To this should be added that the treated wooden articles stand mechanical treatment at higher rates of speed than so far known, as the impregnation oil has a considerable lubricating effect. Furthermore, the surface of the wooden articles better stand painting at a later time. Finally, the method is environmentally more acceptable than the known pressure impregnation where salts are used which may be toxicous.

An embodiment of the method according to the invention is characterised in that a drier (siccative) is added to the linseed oil used thereby accelerating the curing of the oil.

A second embodiment of the invention according to the invention is characterised in that colour pigments have been added to the linseed oil used. As a result, the finished wooden articles get a more attractive appearance, as the colour pigments particularly settle on the surface of the wooden articles. The penetration depends on the type of wood, dimension and original place in the stem.

A further embodiment of the method according to the invention is characterised in that the treated articles are of old (previously used) wood. As a result, old apparently worn out wood may find new use, for instance
5 in connection with a restoration, as the wood gets back its old strength, indeed may get stronger than it naturally was.

According to the invention, the immersion may be carried out for a relatively short period whereby the penetration
10 of the linseed oil in the wooden material takes place to a rather slight depth. Thereby wooden articles of a rather different quality may be obtained.

Furthermore, according to the invention the wooden articles may be subjected to a controlled drying (curing process)
15 in heat chamber or autoclave after the impregnation with the hot linseed oil. It is thereby further ensured that the end product is not crooked.

Moreover, according to the invention the linseed bath may have a temperature of 145-250°C, preferably 175-245°C,
20 during the immersion of the wooden articles, which has been found particularly advantageous.

Further, according to the invention the linseed bath may have a temperature of 210-240°C, preferably 225-235°C during the immersion of the wooden articles, which is also
25 very advantageous.

Finally, according to the invention, the wooden articles may be kept immersed for at least 10 minutes, preferably 15-45 minutes, whereby a suitable oozing in of oil is obtained.

30 The present method is environmentally acceptable because the substances used are degradable and possible residues may be used for other purposes, for instance paint.

The invention is described in greater details below with reference to the Examples.

Example 1

A number of new window frames (500 by 1000 mm) made of
5 pinewood, which were desired to be improved as regards the
wood quality were freed of glass and possible hardware.
The frames were then immersed into a large heated vessel
containing linseed oil varnish, i.e. pure linseed oil with
drier (siccative) added and an insecticide and fungicide.
10 The linseed oil had a temperature of 250°C or slightly
below. The frames were kept immersed for 10-20 minutes.
They were then taken out of the bath and brought to a
drying chamber where the air temperature was about 50°C
and the air change was uniformly slow. The drier (sic-
15 cative) added to the linseed oil comprised 0.07% lead ,
0.003% manganese and 0.004% calcium. The following naph-
thanates: 0.3% copper naphthanate and 0.3% zink naphthanate
were added as insecticide and fungicide.

The finished frames displayed a marked improvement of the
20 strength of the wood and the joints between the frame
sections of which the individual frame is constructed,
proved to be very compact. The frames displayed no tendency
to warp (crookedness) and were entirely without fungus
spores. Furthermore, the frames did not provide genial soil
25 to the fungus spores.

Example 2

It was desired to preserve and provide new strength to an
article of prepared wood (an old piece of skirting board)
which was attacked by dry rot and insects. The article was
30 immersed in a bath of 180°C hot oil and kept under the
surface of the oil for 20 minutes. At the end of this
period the water evaporation from the article had ceased
and there were only signs of the oil sizzling around the

article. The bath which comprised linseed oil had been admixed with a drier (siccative) of 0.07% lead, 0.003% manganese and 0.004% calcium.

The following naphthanates: 0.3% copper naphthanates and 0.03 zink naphthanates were added as insecticide and fungicide.

After being taken out of the bath and excessive oil had dripped off and dried off, the article was left to dry in the open. The surface had dried after 48 hours. A corresponding article was impregnated in a similar manner but then placed in a heat chamber with air change and an average temperature of about 50°C. The latter article was dry and ready for use after 24 hours. Both articles were without warpings and resistant to both fungus and insect attacks.

Example 3

A number of wooden articles of pinewood were formed to have dimensions almost corresponding to the dimentions of the worked end products. The degree of humidity of the starting articles was around 20%. The articles were immersed in a bath of 150°C hot linseed oil and were kept under the surface of the oil for 45 minutes. At the end of this period only signs of the oil sizzling around the articles were seen. The water evaporation had ceased before then.

Drier (siccative) in the form of 0.07% lead, 0.003% manganese and 0.004% calcium was added to the oil.

After taking the articles out of the bath, dripping off and drying off of excessive oil, the articles were dried in heating chamber with air change. The air was heated to about 80°C. The working took place after eight hours. It appeared that the oil had penetrated into the spring wood areas of the wood and therefore contributed in strengthen-

ing the structure of the wood. The working was carried out with conventional tools and machines. The degree of humidity had fallen to eight. The finished articles were without warpings (crookedness). The oil was admixed with
5 fungicide preventing the articles from being attacked by fungus.

The invention may be varied in many ways without thereby deviating from the scope of its idea. The time spent by the articles in the linseed bath may thus be extended to
10 several hours. Possibly, the drying time may be extended to more days.

Claims

1. A method of quality improvement of wooden articles, such as improved preservation of wood through impregnation thereof, and where the impregnation is carried out by the
5 wooden articles being immersed in a bath of hot linseed oil or similar vegetable oil, heated to at least 110°C, whereby the water present in the wood evaporates and diffuses through the wood and the oil while the hot oil simultaneously penetrates into the pores and cavities of
10 the wood, whereupon the wooden articles are taken out of the bath and the oil oozed in is made to cure and thereby to stiffen the wood, c h a r a c t e r i s e d in that during the immersion of the wooden articles, the linseed oil bath has a temperature of up to 250°C, preferably near
15 250°C, and that an insecticide and/or fungicide has been added to the linseed oil.

2. The method as claimed in claim 1, c h a r a c -
t e r i s e d in that drier (siccative) has been added to the linseed oil used.

20 3. The method as claimed in claim 1 or 2, c h a r a c -
t e r i s e d in that colour pigments have been added to the linseed oil used.

4. The method as claimed in claim 1, 2 or 3, c h a r -
a c t e r i s e d in that the treated articles are of old
25 (used) wood.

5. The method as claimed in one or more of the claims 1-4, c h a r a c t e r i s e d in that the impregnation is carried out for a relatively short period, whereby the penetration of the linseed oil in the wooden material takes
30 place to a rather slight depth.

6. The method as claimed in one or more of the claims 1-5, c h a r a c t e r i s e d in that after having been

impregnated at the high temperature by the linseed oil, the wooden articles are subjected to a controlled drying (curing process) in heat chamber or autoclave.

7. The method as claimed in one or more of the claims 1-6,
5 c h a r a c t e r i s e d by the linseed oil bath having a temperature of 145-250°C, preferably 175-245°C, during the immersion of the wooden articles.

8. The method as claimed in claim 7, c h a r a c t e r -
i s e d by the linseed bath having a temperature of 210-
10 240°C, preferably 225-235°C, during the immersion of the wooden articles.

9. The method as claimed in one or more of the claims 1-8,
c h a r a c t e r i s e d in that the wooden articles are kept immersed in the linseed bath for at least 10 minutes,
15 preferably 15-60 minutes.

AMENDED CLAIMS

[received by the International Bureau on 29 September 1992 (29.09.92); original claims 1 and 7 amended; remaining claims unchanged (2 pages)]

1. A method of quality improvement of wooden articles, such as improved preservation of wood through impregnation thereof, and where the impregnation is carried out by the
5 wooden articles being immersed in a bath of hot linseed oil or similar vegetable oil, whereby the water present in the wood evaporates and diffuses through the wood and the oil while the hot oil simultaneously penetrates into the pores and cavities of the wood, whereupon the wooden
10 articles are taken out of the bath and the oil oozed in is made to cure and thereby to stiffen the wood, c h a r a c t e r i s e d in that during the immersion of the wooden articles, the linseed oil bath has a temperature in the range of 145°- 250°C, preferably near 250°C, and
15 that an insecticide and/or fungicide has been added to the linseed oil.

2. The method as claimed in claim 1, c h a r a c t e r i s e d in that drier (siccative) has been added to the linseed oil used.

20 3. The method as claimed in claim 1 or 2, c h a r a c t e r i s e d in that colour pigments have been added to the linseed oil used.

4. The method as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the treated articles are of old
25 (used) wood.

5. The method as claimed in one or more of the claims 1-4, c h a r a c t e r i s e d in that the impregnation is carried out for a relatively short period, whereby the penetration of the linseed oil in the wooden material takes
30 place to a rather slight depth.

6. The method as claimed in one or more of the claims 1-5, c h a r a c t e r i s e d in that after having been

impregnated at the high temperature by the linseed oil, the wooden articles are subjected to a controlled drying (curing process) in heat chamber or autoclave.

7. The method as claimed in one or more of the claims 1-6,
5 c h a r a c t e r i s e d by the linseed oil bath having a temperature of 175-245°C, during the immersion of the wooden articles.

8. The method as claimed in claim 7, c h a r a c t e r -
i s e d by the linseed bath having a temperature of 210-
10 240°C, preferably 225-235°C, during the immersion of the wooden articles.

9. The method as claimed in one or more of the claims 1-8,
c h a r a c t e r i s e d in that the wooden articles are
kept immersed in the linseed bath for at least 10 minutes,
15 preferably 15-60 minutes.

INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 92/00148

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 27 K 3/34, 3/52		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	B 27 K	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	FR, A, 397786 (M. CYPRIEN GILLET) 17 May 1909, see the whole document --	1-9
A	SE, B, 465 760 (KEMIRA KEMWOOD AB) 28 October 1991, see the whole document -- -----	1-9
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
4th August 1992	1992 -08- 07	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	Irja Berlin <i>Irja Berlin</i>	



ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/DK 92/00148

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A- 397786	09-05-17	NONE	
SE-B- 465 760	91-10-28	NONE	